CμL 9958
DECADE COUNTER
COUNTER MICROLOGIC® INTEGRATED CIRCUITS

GENERAL DESCRIPTION - The CμL9958 is a complete Decade Counter consisting of four cascaded binary triggered flip-flops modified by a feedback loop to count in the familiar 8-4-2-1 code. Provision is made for clearing and presetting any one of the possible decimal states. The monolithic structure employs only resistors and transistors and is manufactured with Fairchild Planar* Epitaxial process to assure maximum performance and reliability.

The Decade Counter is designed to operate in the 0° to +75°C temperature range with nominal power supply voltage of 3.3 to 5.5 volts. It is also available in the -55°C to +125°C temperature range with power supply voltage of 4.0 to 4.4 volts.

The CμL9985 is available in the hermetically sealed 14 pin Dual In-line ceramic package, and in the 8 pin modified TO-5 metal can.

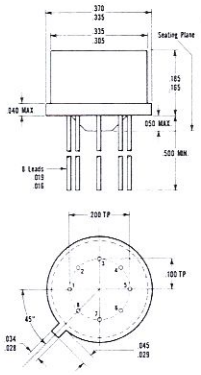
ABSOLUTE MAXIMUM RATINGS (Note 1)

Storage Temperature	-55°C to +150°C
Voltage at pin 7 (0°C 14 on Dip (0°C to +75°C)	+6.0 V
Count Input Pin Voltage	+4.0 V, -2.0 V
Reset Input Pin Voltage	+4.0 V, -2.0 V
Current into Each Output Terminal	± 5.0 mA

ELECTRICAL CHARACTERISTICS (25°C Free Air Temperature unless otherwise noted)

Parameter	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	3.3		5.5		
Count Input-Low			0.45	V	
Count Input-High	1.2			V	
Count Input Pulse Width-High	150			ns	
Count Input Slope-Positive Going	1.0			V/μs	
Maximum Count Input Frequency			2.0	MHz	
Reset Input-Low			0.45	V	
Reset Input-High	1.2			V	
Output-Low			0.35	V	I_{out} = 0.4 mA V_{CC} = 4.0 V
Output-High	1.4			V	I_{out} = -0.7 mA V_{CC} = 3.6 V
Power Consumption		140		mW	V_{CC} = 4.0 V
Count Input Impedance	2 kΩ in series with a transistor base-emitter diode				
Reset Input Impedance	300 Ω in series with a transistor base-emitter diode				
Maximum Delay from Count Input to Z_8 Output (count 7 to 8)	300 ns (Load: 2 kΩ parallel with 50 pF from each output to ground)				

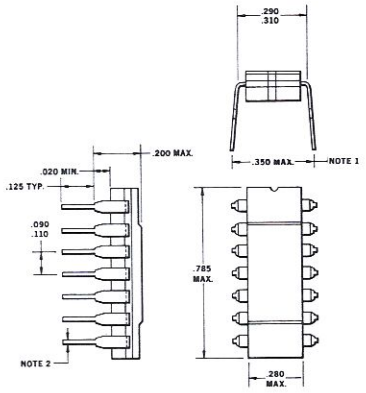
PHYSICAL DIMENSIONS
(SIMILAR TO TO-5)



NOTES: Dimensions as per latest JS-10 committee.
All dimensions in inches.
Leads are gold-plated kovar.
Package weight is 1.12 grams.

(PRODUCT CODE: U5B995879X)

TYPICAL DUAL IN-LINE PACKAGE



NOTES:
1. Leads are intended for insertion in hole rows on .300" centers. They are purposely shipped with "positive" (.350) misalignment to facilitate insertion.
2. Board drilling dimensions should equal your practice for a conventional .020 inch diameter lead.

(PRODUCT CODE: U6A995879X)

*Planar is a patented Fairchild process.

NOTE:
(1) These ratings are limiting values above which serviceability of unit may be impaired.

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MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 291877, 3015048, 3025589, 3064167, 3108359, 3117260; OTHER PATENTS PENDING.

RESET/PRESET

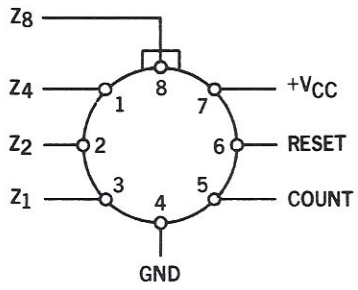
The circuit is reset to count 0 (all outputs high) with a high level at the reset input pin.

To preset an arbitrary count:

1. Reset to count 0 and then return the reset pin to a low level.
2. Ground (below 0.45 V) the appropriate outputs.

TO-5 CONNECTION DIAGRAM

(Top View)



14 PIN DUAL IN-LINE CONNECTION DIAGRAM (TOP VIEW)

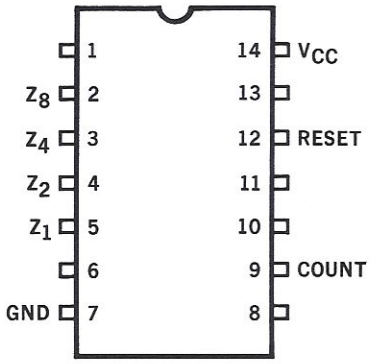
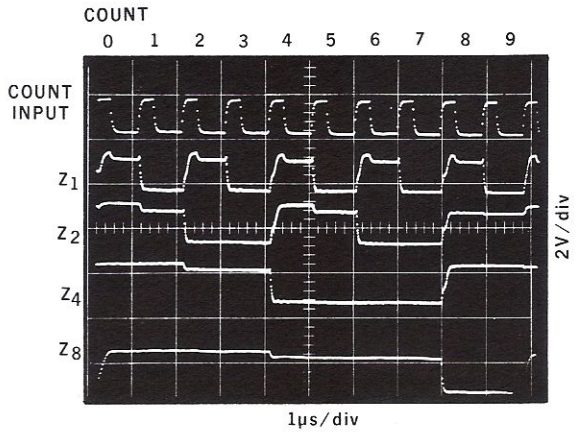


TABLE OF OUTPUT STATES

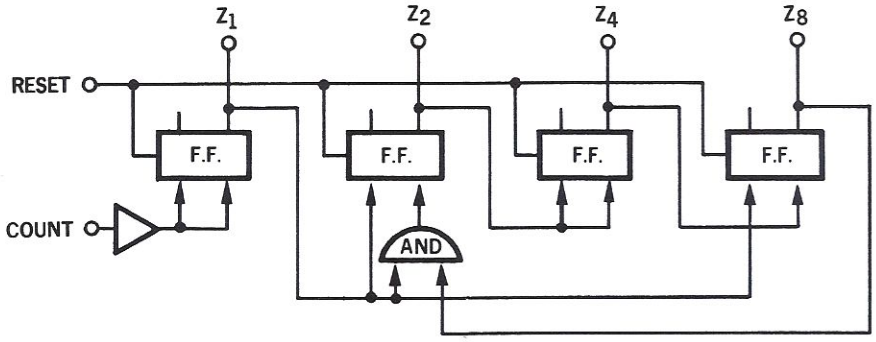
COUNT (H=High, L=Low)

	0	1	2	3	4	5	6	7	8	9
Z_1	H	L	H	L	H	L	H	L	H	L
Z_2	H	H	L	L	H	H	L	L	H	H
Z_4	H	H	H	H	L	L	L	L	H	H
Z_8	H	H	H	H	H	H	H	H	L	L

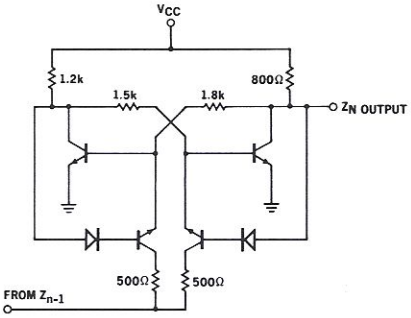
OUTPUT WAVEFORMS



BLOCK DIAGRAM

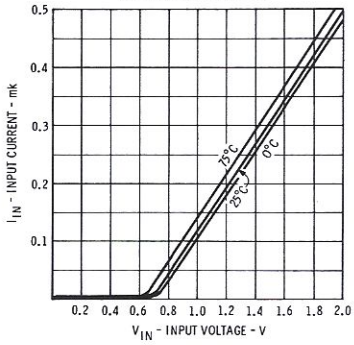


SCHEMATIC DIAGRAM OF DECADE FLIP-FLOP

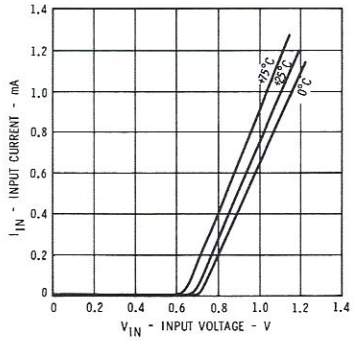


TYPICAL ELECTRICAL CHARACTERISTICS

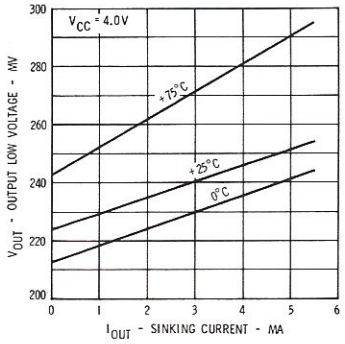
COUNT INPUT CHARACTERISTIC



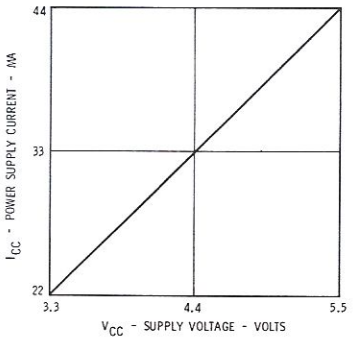
RESET INPUT CHARACTERISTIC



OUTPUT CHARACTERISTICS (OUTPUT LOW)



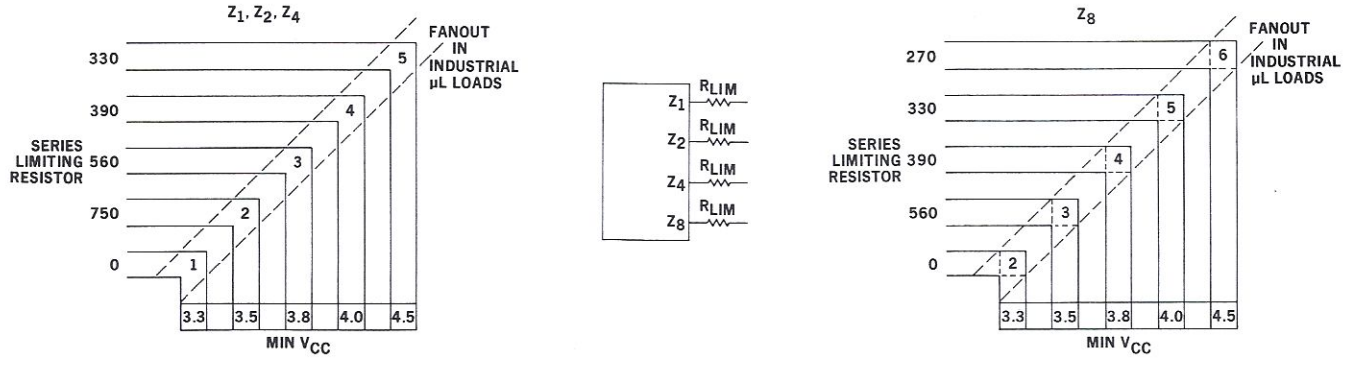
POWER SUPPLY CURRENT VERSUS SUPPLY VOLTAGE



LOADING RULES

DRIVING DEVICE	AT V_{CC} OF	CAN DRIVE
CμL 9958:		
Z_1, Z_2, Z_4	3.3 Min.	1 CμL 9959
Z_8	3.3 Min.	1 CμL9959 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 Min.	2 CμL 9959
Z_8	4.0 Min.	2 CμL9959 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 V Min. and one 390 Ω current limiting resistor in series with each output	4 CμL 9959
Z_8	4.0 V Min. and one 330 Ω current limiting resistor in series with Z_8 output	4 CμL9959 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	3.3 Min.	1 CμL 9960
Z_8	3.3 Min.	1 CμL9960 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 Min.	2 CμL 9960
Z_8	4.0 Min.	2 CμL9960 plus 1 CμL 9958 Count Input
Z_1, Z_2, Z_4	4.0 Min. and one 330 Ω current limiting resistor in series with each output	5 CμL 9960
Z_8	4.0 Min. and one 270 Ω current limiting resistor in series with Z_8 output	5 CμL9960 plus 1 CμL 9958 Count Inputs
Industrial Range Milliwatt RTL:	3.6 V ± 10%	1 CμL9958 Count Input
Industrial Range RTL:	3.6 V ± 10%	6 CμL9958 Count Inputs, or 1 CμL 9958 Reset Input
Industrial Range DTL 6k Family:	4.5 Min.	1 CμL9958 Count Input
Industrial Range DTL 2k Family:	4.5 Min.	3 CμL9958 Count Inputs, or 1 CμL 9958 Reset Input

CμL 9958 FAN-OUT VERSUS V_{CC} AND SERIES LIMITING RESISTORS



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